

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Dimensional Sandstone)

Fatal Powered Haulage Accident

September 1, 2003

Cinder Lane Quarries
Rimrock Quarries
Crossville, Cumberland County, Tennessee
Mine I.D. No. 40-03211

Investigators

Donald B. Craig
Supervisory Mine Safety and Health Inspector

Donald R. Baker
Mine Safety and Health Inspector

Delilah G. Tessaro
Mine Safety and Health Inspector

Eugene D. Hennen
Civil Engineer, P.E.

Elsa Montoya
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Southeast District
135 Gemini Circle, Suite 212; Birmingham, AL 35209
Michael A. Davis, District Manager

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Dimensional Sandstone)

Fatal Powered Haulage Accident

September 1, 2003

Cinder Lane Quarries
Rimrock Quarries
Crossville, Cumberland County, Tennessee
Mine I.D. No. 40-03211

Investigators

Donald B. Craig
Supervisory Mine Safety and Health Inspector

Donald R. Baker
Mine Safety and Health Inspector

Delilah G. Tessaro
Mine Safety and Health Inspector

Eugene D. Hennen
Civil Engineer, P.E.

Elsa Montoya
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Southeast District
135 Gemini Circle, Suite 212; Birmingham, AL 35209
Michael A. Davis, District Manager

OVERVIEW

Augustin Gomez, laborer, age 20, was fatally injured on September 1, 2003, when the forklift he was operating left the roadway and overturned. Gomez was traveling down the roadway into the quarry to move pallets that had been stacked with graded rock.

The accident occurred because the service brakes on the forklift had not been maintained and were not functional. Gomez was unable to control the forklift as it descended the unbermed roadway and overturned at the elevated edge.

GENERAL INFORMATION

Cinder Lane Quarries, a dimensional sandstone operation, owned and operated by Rimrock Quarries, was located on Cinder Lane at Crossville, Cumberland County, Tennessee. The principal operating official was Clifford L. Hamby, owner-operator. The mine had operated intermittently for approximately 1½ years. Four employees usually worked eight-hour shifts a day, when the mine operated.

A declined roadway accessed the mine from the entrance at the top of a small ridge. Sandstone was mined from multiple benches after overburden was removed. The stone was drilled using hand-held drills, then blasted. Employees used picks and mattocks to separate the fractured sandstone into three ranges of thickness. The sandstone was placed on pallets according to size. A forklift loaded the pallets from the pit onto a flatbed truck. The rock was then transported to stone yards where it was weighed, washed, and prepared for sale to customers out of state.

Another forklift, on site, had been used in the past to move pallets of rock but had not been used for about two weeks prior to the accident because it needed repaired.

MSHA had not been notified that this mine was in operation prior to the accident. An inspection of this mine was conducted following completion of the fatal investigation.

DESCRIPTION OF ACCIDENT

On the day of the accident, Augustin Gomez (victim) reported to work at about 7:30 a.m., along with laborers, Gerardo Bravo and Matildi Ramoz. Gomez drove Bravo and Ramoz into the quarry where they began sorting and stacking sandstone on pallets. Gomez then drove back up the roadway, about 1/5 of a mile, to the top of the quarry where the forklift was parked. He was going to use the forklift to move pallets of rock that had been loaded in the quarry.

Bravo and Ramoz could not see Gomez after he returned to the top of the quarry but they heard the forklift start. At about 7:50 a.m., they heard a loud noise, traveled up the roadway, and found the forklift overturned on

its side at the elevated roadway edge. Gomez was thrown from the seat and found laying face down on the ground with the machine's canopy leg lying on him. He was not responsive. Ramoz ran to a neighboring house to call for help.

The County rescue team arrived a short time later and attended to Gomez. He was transported to a local medical center where he was pronounced dead.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 3:10 p.m., on September 1, 2003, by a telephone call from Sergeant John Dishman, Cumberland County Sheriff's Department, to Harry L. Verdier, assistant district manager. An investigation was started the next day. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners. MSHA's accident investigators traveled to the mine, made a physical inspection of the accident scene, interviewed employees, and reviewed conditions and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management and employees.

DISCUSSION

Location of the Accident

The accident occurred on the quarry access road that had been constructed about five weeks earlier. The road was nine feet wide, 1/5 of a mile long, and had an approximate 8 percent grade. The outside edge of the road had a 4 foot elevation and was not bermed for a length of 50 feet where the accident occurred.

The road was built with clay, fill dirt, and waste rock from the quarry. Rocks that projected from the roadway made travel difficult. Tire marks were found on a rock that protruded from the roadway. The investigation concluded that the forklift struck the rock prior to leaving the roadway.

Equipment

The forklift normally used to move pallets at this mine was manufactured by Hydro-Ax. This forklift had been removed from service because it had a defective accelerator cable. The forklift did not have primary brakes but did have a hydro-static system equipped with a forward or reverse directional foot pedal. When working properly, the machine would stop moving when the operator's foot was removed from the pedal.

The machine involved in the accident was a Massey-Ferguson Model 2500 Rough Terrain forklift manufactured in 1974. It had a Perkins 3-cylinder diesel engine and was equipped with a 3-speed transmission with a high and low range with a separate shift for forward and reverse, which gave the forklift a total of six speeds in both forward and reverse.

The front tires were 16.9 x 24 and the rear tires were 8.25 x 15. The rear wheels steered the forklift. Information from the manufacturer listed the weight of the forklift as 10,670 pounds with a maximum lift weight of 6,000 pounds. The total gross vehicle weight (GVW) was 16,670 pounds.

The forklift was equipped with a light-weight canopy that afforded the operator with protection against sun or rain. The forklift was not equipped with a seat belt. MSHA regulations do not require forklifts to be equipped with ROPS or seat belts.

The Massey-Ferguson forklift had not been used for about a year. It had been placed into operation two weeks before the accident because the Hydro-Ax forklift normally used had been taken out of service for repairs. The Massey-Ferguson forklift had been parked for two days prior to being used by Gomez on the day of the accident.

Brakes

The service brakes consisted of two disc brakes, one located on each side of the differential inside the front axle housing. The brakes were the dry disc type with composition faced discs. When the service brakes were applied, discs splined to the axle shaft were forced into stationary discs attached to the axle housing by activating discs which were located between the composition faced discs. Brake actuating levers pivoted on each of the axle housings energized the activating discs. Individual left and right brake pedals and master cylinder assemblies connected to their respective slave cylinders moved the actuating levers to engage the

service brake. The brake pedals were located together on the right side of the operator's compartment so the machine operator could engage both brakes with one foot.

The dry disc brake on the left side of the differential also acted as the park brake when the actuating lever was activated by a mechanical linkage instead of the slave cylinder. A foot pedal located on the left side of the steering column actuated the park brake mechanical linkage. Once the park brake pedal was pushed, the operator had use of a latch located above the foot pedal to keep the park brake applied. To release the park brake, the operator pushed on the park brake pedal and released the latch.

During the investigation, when the left service brake pedal was pushed independently from the right service brake pedal, the pedal went all the way to the floor. The master cylinder offered no resistance to the movement of the brake pedal. When the master cylinder fill plug was removed, no brake fluid was found in the master cylinder. There was also a layer of rust in the bottom of the master cylinder. The master cylinder was replaced and an attempt was made to bleed the left brake assembly. While bleeding the left side brake, the fluid from the master cylinder bypassed the seals in the slave cylinder and flowed onto the ground, showing the slave cylinder was also defective.

When the right service brake pedal was applied, it hit the right front canopy leg. The paint had worn off the canopy leg and a layer of rust had accumulated from where the brake pedal had been hitting the leg of the canopy prior to the accident. A pressure gauge was placed in the right service brake circuit and the circuit was thoroughly bled. When the master cylinder was activated, the pressure in the circuit was 250 psi. As long as the pedal was held down, the system maintained the 250 psi pressure.

To determine if an improper adjustment of the brake was causing the pedal to hit the canopy leg, the brake adjustment was checked according to the method outlined in the service manual. This check revealed the brake pedal linkage was out of adjustment by $\frac{3}{8}$ inch. The linkage was adjusted by the $\frac{3}{8}$ inch, and although the brake pedal still hit the canopy leg, the adjustment allowed the linkage to push the plunger into the master cylinder an additional $\frac{3}{8}$ inch before the brake pedal hit the

canopy post. With the increased master cylinder stroke, the pressure in the system increased to 350 psi.

In order to determine what pressure could be developed in the brake system with full stroke of the pedal (i.e., if the pedal did not hit the canopy leg), the brake linkage was adjusted another $\frac{3}{8}$ inch. When the brake was applied, the pedal did not hit the canopy leg and the pressure, which could be maintained in the system, increased to 450 psi. Because 450 psi was lower than the pressure expected, the master cylinder was replaced. In addition, the brake linkage was adjusted according to instructions in the service manual, and the air was bled from the system. With the new master cylinder installed, the right side brake pressure increased to 800 psi.

When the adjustment of the park brake linkage was checked in accordance with procedures in the service manual, the park brake linkage was found to be adjusted properly.

Steering

A check of the power steering system revealed that the power steering fluid had leaked out while the forklift was lying on its side. Tests conducted after the fluid was replaced showed that the steering operated fully in both directions.

Weather

Weather on the day of the accident was dry and clear.

Training and Experience

Gomez had a total of 5 years experience as a laborer and had worked intermittently at this operation for approximately six months. He had not received the required training in accordance with 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following causal factors were identified:

Causal Factor: A pre-operation inspection to identify safety defects had not been conducted prior to Gomez placing the Massey-Ferguson forklift in operation on the day of the accident. The forklift was placed in service even though the service brake system would not stop or hold it on the roadway to the quarry.

Corrective Action: Procedures should be established to ensure that all mobile equipment is inspected for defects prior to being placed into operation. Defects that affect safety should be corrected prior to persons using the equipment. Equipment operators should be trained and knowledgeable in identifying safety defects.

Causal Factor: Berms or guardrails were not constructed along a 50-foot length of the elevated outer edge of the roadway to the quarry. This roadway had been constructed five weeks before the accident and mobile equipment had been using the roadway since it was constructed.

Corrective Action: Procedures should be established that ensure berms or guardrails are provided and maintained where a drop-off exists that could cause mobile equipment to overturn. Roadways should be inspected frequently to ensure mid-axle height berms are in place prior to mobile equipment traveling the roadway.

Causal Factor: Rocks that protruded from the surface of the new road to the quarry had not been covered with material or removed prior to the road being used. The forklift tires struck one or more of the rocks, causing the forklift to veer off the roadway.

Corrective Action: Procedures should be established to ensure roadways are free of rock, debris, or other conditions that may create hazards to the operation of mobile equipment.

Causal Factor: Task training had not been provided to the employees regarding the safe and proper operation of the Massey-Ferguson forklift prior to assigning employees to use it. The transmission gear controls for

the Massey-Ferguson forklift were different from the controls on the Hydro-Ax forklift that had been used at the mine previously.

Corrective Action: Procedures should be established that ensure all employees are task trained and knowledgeable regarding the health and safety aspects of the equipment they operate and the jobs they are assigned.

CONCLUSION

The accident occurred because the service brakes on the forklift had not been maintained and were not functional. The victim was unable to control the forklift as it descended on the roadway. Berms had not been provided on the outer edge of the roadway. Procedures had not been established to ensure defects on self-propelled mobile equipment were corrected before the equipment was placed in operation.

VIOLATIONS

Order No. 6119837 was issued on September 2, 2003, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on September 1, 2003, when an employee was operating a forklift down a slight grade. The forklift ran off the road and overturned, pinning the victim under the canopy of the cab. This order is issued to assure the safety of persons at this operation and prohibits any work in the affected area until MSHA determines that it is safe to resume normal operations. The mine operator shall obtain prior approval from an authorized representative for all actions to recover and/or restore operations in the affected area.

This order was terminated on September 25, 2003. Conditions that contributed to the accident no longer exist and normal mining operations can resume.

Citation No. 6100710 was issued on September 19, 2003, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.14101(a)(1):

A laborer was fatally injured at this operation on September 1, 2003, when the forklift he was operating left the roadway and overturned. The service braking system was not capable of stopping the equipment. The left wheel master and slave cylinders were completely dry and rusted on the inside. The right front wheel brake tested at about 50 percent of its rated capacity.

This citation was terminated on September 19, 2003. New brake cylinders were installed on the left and right braking systems on the Massey-Ferguson, model 2500, forklift machine. The left brake slave cylinder was rebuilt. The brakes were retested after the repairs were made and found to stop and hold the forklift properly.

Citation No. 6100711 was issued on September 19, 2003, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.9300(a):

A laborer was fatally injured at this operation on September 1, 2003, when the forklift he was operating left the roadway and overturned. A berm or guardrail had not been provided for approximately 50 feet along the elevated roadway leading to the quarry where a drop off of 3 to 5 feet existed.

This citation was terminated on September 24, 2003. A berm consisting of dirt and rock was built along the entire outer edge of the roadway.

Citation No. 6100712 was issued on September 19, 2003, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.9313:

A laborer was fatally injured at this operation on September 1, 2003, the forklift he was operating left the roadway and overturned. Rock debris was found on the roadway at the accident scene. The forklift apparently struck the rocks, causing it to veer off the roadway and overturn.

This citation was terminated on September 24, 2003. The rock debris projecting out of the roadway was completely removed from the roadway.

Citation No. 6100713 was issued on September 19, 2003, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 46.7:

A laborer was fatally injured at this operation on September 1, 2003, when the forklift he was operating left the roadway and overturned. The victim had not received task training on the Massey-Ferguson model 2500 forklift.

This citation was terminated on September 24, 2003. Task training has been given to the employee authorized to operate the forklift machine.

Approved by: _____ Date: _____
Michael A. Davis
District Manager

APPENDIXES

- A. Persons Participating in the Investigation
- B. Persons Interviewed

APPENDIX A

Persons Participating in the Investigation

Rimrock Quarries

Clifford L. Hamby	owner-operator
Ronnie L. Campbell	truck driver
Gerardo Bravo	laborer
Matildi Ramoz	laborer

Mine Safety and Health Administration

Donald B. Craig	supervisory mine safety and health inspector
Donald B. Baker	mine safety and health inspector
Delilah G. Tesaro	mine safety and health inspector
Eugene D Hennen	civil engineer, P.E.
Elsa A. Montoya	mine safety and health specialist

Tennessee Cumberland County Sheriff's Department

John Dishman	sergeant
--------------	----------

APPENDIX B

Persons Interviewed

Rimrock Quarries

Clifford L. Hamby	owner-operator
Ronnie L. Campbell	truck driver
Gerardo Bravo	laborer
Matildi Ramoz	laborer